



Lessons Learned in Implementing Hexavalent Chromium and other Material Restrictions

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Overview



- Target Material Requirement
- Implementation Opportunities
- Supply Chain
- Process Developed
- Considerations to Maximize Value While Limiting Cost

Requirement



- Army approval required to use:
 - Asbestos
 - Beryllium Alloys and Compounds
 - Cadmium
 - Hexavalent Chromium
 - Hydrazine
 - Lead and Lead Compounds
 - Mercury
 - Methylene Chloride
 - Methyl Ethyl Ketone
 - Nickel and Nickel Compounds
 - Polychlorinated Biphenyls (PCBs)
 - Phenol
 - Tetrachloroethylene
 - Toluene
 - Toluene Diisocyanate
 - Trichloroethylene
 - Xylenes
 - Radioactive Materials

Opportunities



- Changing Supplier Direction
 - “But this is what we use on our other DoD programs.”
 - “We thought we could still use it.”
- Supply Chain
 - Mature Processes did not exist
 - Targeted materials often not easy to recognize
 - Drilling down in supply chain
 - Availability of Alternates
 - Lead times
 - Maintaining schedule
 - Maturity of Alternatives
 - Qualification

Opportunities (cont.)



- Boundary/Exemption Considerations
 - NAS 411 – Delivered Hardware and Operation/Support
 - Commercial-Off-The Shelf Hardware
 - Availability of Alternative Vendors
 - Can they change the product line
 - Accept as-is or modify
 - Exemptions:
 - Materials containing less than .1% of the targeted material by weight
 - Calculation Method
 - Materials contained in government furnished equipment
 - Materials in equipment that will not be delivered to the Customer (e.g., test stands).
 - Materials in brassboards used for testing
 - Electronic COTS

Supply Chain Buckets



Easiest



Hardest

- **Make Parts** – You specify the materials, relatively easy to obtain material information
- **Simple COTS** – Can typically
 - Work with the suppliers to determine the materials
 - Determine from vendor description (e.g., Silicone rubber gasket)
- **Buy Parts**
 - Performance specification or materials specified
 - Potential issues
 - Repair/touch-up (e.g, MIL-DTL-5541, Type I touch-up on anodize coatings)
 - Checking the hardware material list, but not reviewing the “process” specifications (e.g., “Topcoat with MIL- PRF-XXXXX per PS XXXX” on drawing, but didn’t check the primer and surface preparation)
- **Complex COTS**
 - Rely on the COTS manufacturer to do the material analysis.
 - Technical knowledge and due diligence can vary widely from supplier to supplier

Process Overview



- Strived to review designs as early as possible
 - Review drawings before released
- Determine if alternate material is available
 - Alternate Material: material that meets all technical and performance requirements of the targeted material and does not incur major health/safety, cost or schedule impacts.
- If alternate material not available, then submit a request to use targeted material
 - Implemented form to capture specific information to aid management decision making
 - Bundled requests (e.g., by hardware or material) to minimize paperwork
 - Blanket approval across the program for common use items (e.g., beryllium alloys in electrical connectors)

Ensure process is dynamic, so that all material changes (drawing, material, process, supplier, etc.) are evaluated

Process Issues



- Timing of submittals and completion of reviews
 - Establish timelines tied to hard dates such as hardware delivery
- Tracking of requests/approvals
 - Consider incorporating in an existing process (e.g., waiver/deviation)
- Drawings specific enough to get the required coating, e.g., MIL-DTL-5541
 - Type I (hexavalent chromium)
 - Type II
- Not only material, but also process specifications can introduce materials

Considerations



- When possible, standardize list of targeted materials across DoD programs for new programs
 - Asbestos, Cadmium, Hexavalent Chromium, Mercury, + ??
- Consider life cycle risk based analysis with regard to release to the environment and safety to personnel
 - Beryllium copper in bushings versus beryllium copper in electrical connectors
- Use existing framework when possible
 - Is RoHS compliant good enough in specific cases? [RoHS; .1 % lead, .1% mercury, .1% hexavalent chromium, .1% PBB, .1% PBDE, and .01% cadmium]
- Benefits of using COTS vs modifying them
- GFE, directed buys, legacy hardware interfaces
- Understanding the detailed drivers behind requirements allows process tailoring to better obtain targeted information
 - Requirements drive design and costs
 - Must balance performance and environmental concerns

Maximize Value While Limiting Cost



Questions?